

CLAIMS

- 1) A telemetry system for the bi-directional communication of data between a well point and a surface terminal unit (A), which can be used inside drilling or production strings, comprising:
- data transmission and optional reception devices;
 - an active vehicle (8), which can be equipped with various automation levels, ranging from purely tele-operated to completely autonomous, for unwinding and pulling a connection line, capable of moving inside the drilling or production string, or a passive vehicle (E), moved by means of a deploying cable and a suitable winding/unwinding device;
 - a connection line (9), containing electric conductors and/or one or more optical fibres, of the transmission and optional reception devices between a well point and its corresponding point situated inside the vehicle or on the surface.
- 2) The telemetry system according to claim 1, wherein, in the case of drilling strings, the well point for communicating data is the well bottom (B).
- 3) The telemetry system according to claims 1 and 2, wherein, in the case of drilling strings, there is also a "garage" (3) for housing the active vehicle (8)

or for housing the passive vehicle (E) together with the winding/unwinding device (D), which allows the free circulation of sludge and the contemporaneous protection of said vehicle.

- 5 4) The telemetry system according to claims 1 and 2, wherein, in the case of drilling strings, the connection line (9) connects the transmission and optional reception devices between the well bottom (B) and its corresponding point inside the vehicle.
- 10 5) The telemetry system according to claim 4, wherein the connection between the corresponding well point, situated inside the vehicle, and the surface terminal unit (A) is effected by means of an RF (radio-frequency) or acoustic, or optical system.
- 15 6) The telemetry system according to claim 4, wherein the connection between the corresponding well point, situated inside the vehicle, and the surface terminal unit (A) is effected by means of wiping contacts.
- 20 7) The telemetry system according to claim 1, wherein, in the case of drilling strings, the connecting line (9) connects the transmission and optional reception devices between a well point (B) and its corresponding point situated on the surface.
- 25 8) An active vehicle (8), capable of moving inside pipes for unwinding and pulling a connection line (9) con-

taining electric conductors and/or one or more optical fibres which allow the transmission and optional reception of data, consisting of:

- a winch (19) of the line to be unwound or pulled;
- 5 • means for supplying electric energy to said vehicle (18);
- electronic control and communication devices (16);
- locomotion devices for the movement inside the
- 10 pipe;
- anchoring devices (17) for guaranteeing safe stoppage inside the pipe.

9) The active vehicle according to claim 8, wherein the locomotion devices consist of a motor (12), suitable

15 gears (13) and at least one wheel (14) which presses against the internal surface of the pipe and is forced by means of a spring (15).

10) The active vehicle according to any of the claims from 8 to 9, wherein said vehicle is equipped with various

20 automation levels, ranging from purely tele-operated to completely autonomous.

11) A passive vehicle (E) for unwinding and pulling a connection line (9) containing electric conductors and/or one or more optical fibres which allow the trans-

25 mission and optional reception of data, consisting of:

- a winch (19) of the line to be unwound or pulled;
- means for supplying electric energy to said vehicle;
- electronic control and communication devices;
- 5 • anchoring devices (17) for guaranteeing safe stoppage inside the pipe.

the vehicle being connected, by means of a detachable deploying cable (G) and a hooking/unhooking device (F), to a suitable winding/unwinding device (D), which
10 can be situated inside the possible garage or outside the string.

12) The vehicle according to claim 8 or 11, wherein the means for supplying electric power are batteries.

13) The vehicle according to claim 8 or 11, wherein the
15 means for supplying electric power consist of the connection line itself (9).

14) The vehicle according to claim 8 or 11, which comprises a head connector (11) for connecting the vehicle itself to a garage for housing said vehicle.

20 15) The vehicle according to claim 8 or 11, which can also comprise:

- measurement and detection devices;
- transmitting devices of television and/or acoustic images;
- 25 • means for activating devices;

- devices for moving parts.

- 16) A garage (3) for housing an active vehicle or a passive vehicle, installed under a top drive (1) and screwed to a drilling string (2) comprising, from the inside to the outside, a suitable container substantially cylindrically-shaped and truncated-conical at the joints (10), in which said vehicle can be inserted, and a wall substantially cylindrically-shaped and truncated-conical at the joints, which forms a space between said container and the wall of the garage allowing the free circulation of the drilling sludge, said substantially cylindrically-shaped container being maintained in an appropriate position by means of supports (C).
- 17) The garage according to claim 16, containing RF (radio-frequency) communication or optical or acoustic systems.
- 18) The garage according to claim 16, containing batteries (5) which store energy for the housed vehicle.
- 19) The garage according to claim 16, wherein the energy is supplied by an electric cable coming from the top drive, optionally by the use of wiping contacts.
- 20) The garage according to claim 16, containing connection devices with the housed vehicle.
- 21) A process for the insertion of a new section of drill-

ing string when an active vehicle is used, which comprises the following steps:

- suspension of the flow of sludge;
- exit of an active vehicle (8) from a housing garage (3) and insertion of said vehicle in the last inserted string section;
- insertion of the new string section;
- return of the vehicle to the garage with the contemporaneous unwinding and pulling of the line;
- clamping of the connection screw threads and re-activation of the flow of sludge.

22) A process for the insertion of a new section of drilling string when a passive vehicle is used, which comprises the following steps:

- suspension of the flow of sludge;
- lowering of a passive vehicle (E), hung to a hooking/unhooking device (F) positioned at the end of a cable (G) unwound by a winch (D) situated inside a garage (3), into the last inserted string section, release of the unhooking device and recovery of said device with the winch;
- insertion of the new string section;
- hooking of the passive vehicle by means of the hooking/unhooking device (F) positioned at the end of the cable (G) run by the winch (D) situated inside the

garage (3) and hoisting of said vehicle back into said garage (Figure 6 d);

◦ clamping of the connection screw threads and re-activation of the flow of sludge.

- 5 23) A process for the recovery of the connection line (9) of the system according to claim 1, in the recovery phase of the string and consequently the dismantling of the pipe forming the string, by commanding the active vehicle to descend or by lowering the passive vehicle into the section to be dismantled, with the contemporaneous rewinding of the suitable length of connection line.
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- 24) A process for the elimination of the connection line (9) of the system according to claim 1, by extracting the active or passive vehicle from the string and using a winch on the surface together with a device for cutting the cable situated close to the communication devices at the well bottom.
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- 25) A process for the elimination of the connection line (9) of the system according to claim 1, in the recovery phase of the string and consequently the dismantling of the pipe forming the string, effected by means of the active or passive vehicle which is equipped with an additional mechanical function which allows it to eject the section of cable recovered from
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the upper end of the vehicle itself, the part of the cable thus ejected being cut by the drilling operators or automatically by the vehicle itself.

- 26) A process for the elimination of the connection line (9) of the system according to claim 1, by means of a container, which is sufficiently long for containing the line to be removed, lowered into the upper end of the string, said container being subsequently pushed by the flow of sludge and/or by its own weight in the direction of the lower end, collecting inside all of the unwound cable in the string, the container stopping at the lower end of the string, where there is a suitable blocking device.